



Incidence of COVID-19 hospitalization and mortality rates, a comparison between a rural and metropolitan community in California



Jessica Kirk, BS¹, Shenoda Abd Elmaseh, MD², Jennifer Lau, PA², Joseph Carroll, MD², Daniel Heyn, MD², Ryan McHenry, DO², Milad Najar Ranjbar, MD², Isain Zapata, PhD¹, Anthony LaPorta, MD¹ Tuan Hoang, MD²

(1)Rocky Vista University College of Osteopathic Medicine. Parker, CO
(2)Providence St. Joseph Hospital. Eureka, CA

OVERVIEW

Coronavirus disease (COVID-19) is a highly infectious virus that typically causes mild to moderate respiratory symptoms. Most patients do not require medical treatment and make a full recovery within 1-2 weeks. Some patients do become seriously ill and require hospitalization, patients with underlying medical conditions such as cardiovascular disease, diabetes, and chronic respiratory disease are more susceptible to severe COVID-19 infections.

Eureka is a small, remote city of Northern California surrounded by sparsely-populated, broad expanses of forest.¹ It lies within Humboldt County and is relatively isolated from major population centers by the Pacific coast to the west, and by rugged mountains to the north, south, and east. Eureka is one of Humboldt's handful of small population centers, which are mainly located along the U.S. Highway 101 that generally runs north-south along the Pacific coastline.¹ Apart from Redding, CA about 150 miles to the east and across the mountains, the nearest major metropolitan areas are at least 4-5 hours and 275 miles away, including San Francisco and Sacramento, CA to the south, and Eugene and Portland, OR to the north. According to the US Census Bureau the average yearly household income in Eureka is \$64,207 vs. San Francisco which is \$181,909.²

We hypothesize that due to its geographic isolation, Eureka presents a unique opportunity to study the impact of the COVID-19 pandemic on rural communities in comparison to major metropolitan areas in the United States.

OBJECTIVE

This study aimed to elicit patterns in incidence and mortality resulting from Covid-19 in a rural area and compare them to the corresponding data for a metropolitan area and the U.S.

METHODS

- Incidence rates for COVID-19 infection, hospitalization, and mortality were calculated from county and hospital-level infection data.
- 2020 US Census population data for Humboldt County between August 1, 2020 and July 31, 2021.
- These were compared against CDC infection data from the City of San Francisco and population data the 2020 US Census.
- The study further broke down infection data into comorbidity and cause-specific death rates.

RESULTS

Data was collected between August 1, 2020, and July 31, 2021. Figure 2 and 3 show the hospital rate differences among these three locations are 0.004% in Humboldt County, 0.009% in San Francisco and 0.015% in the United States. Cause-specific mortality rates are: 0.947% in Humboldt County, 1.464% in San Francisco and 1.492% in the United States.

HOSPITALIZATIONS			
	Humboldt	San Francisco	United States
Hospitalizations per 100K	4.48	8.75	14.83
Average population	136,310	815,201	331,893,745
Average daily hospitalizations (with %)	6.11 (0.004%)	71.29 (0.009%)	49,217.02 (0.015%)

Figure 2: Hospitalization records collected from 8/1/2020 – 7/31/2021 for Humboldt, San Francisco, and the United States

DEATHS			
	Humboldt	San Francisco	United States
Death Total	48	511	452,517
Cumulative Cases	5,071	34,893	30,337,783
Death Rate	0.947%	1.464%	1.492%

Figure 3: Death records collected from 8/1/2020 – 7/31/2021 for Humboldt, San Francisco, and the United States



Figure 1: Map of California with blue stars overlying Eureka and San Francisco

CONCLUSION

There is a significantly less hospitalization and death rate in Humboldt county compared to San Francisco and the USA as a whole. Adherence to strict social-distancing guidelines has been one of the most difficult challenges to overcome during the COVID-19 pandemic. It is postulated that due to the abundance of travel, gathering opportunities and larger population size leads to these observed differences between a large urban population and an isolated rural one (San Francisco v. Eureka). The natural geographic isolation of Eureka created a population that is easily studied for the effectiveness of social isolation on COVID-19 hospitalization and mortality rates.

The comparison of Eureka, San Francisco, and the United States between August 1, 2020- July 31,2021 showed that an isolated and rural population had lower rates of COVID-19 related illness and mortality, suggests there is effect of disease reduction from this isolation. Further research will need to be conducted to confirm this correlation.

REFERENCES

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